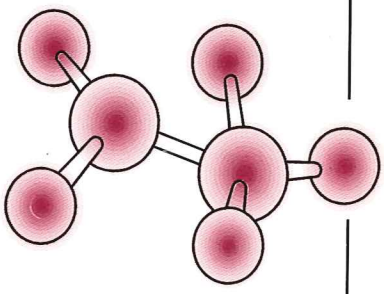
FY Annual Report

1994

Arkansas Science & Technology Authority



Dear Governor Tucker and Distinguished Legislators:

On behalf of the Board of Directors and staff of the Arkansas Science & Technology Authority, we proudly submit to you the agency's FY94 annual report. Please note that the presentation of information relating to programmatic and other activities differs from our traditional report format. For the sake of brevity and clarity, we have condensed much of the text and added more graphics that depict the direct impacts of the Authority's programs and projects on its customers.

This year the Authority saw a dramatic growth in demand for nearly all of its programs, which include Basic and Applied Research Grants, Arkansas EPSCoR, Technology Development, Technology Transfer Services, Technology Transfer Assistance Grants, and Seed Capital Investment. Approximately 521 individuals and businesses inquired about funding opportunities and assistance, up 19 percent from last year. The quality of the proposals submitted and projects funded continued to improve as well, evidenced by the "Highlight Projects" described in this report.

We also note the Authority's involvement in special regional and statewide projects such as the Arkansas Ventures in Education Program, Arkansas Manufacturing Extension Network, Rural Systemic Initiative, Arkansas' Information Network and statewide Research & Development Planning.

The impact of these programs and project activities affirms the vital role that the Arkansas Science & Technology Authority plays in the overall economic development of the state. With ongoing support, the Authority will continue to bring the benefits of science and advanced technology to the people and state of Arkansas. Thank you for your support of the Authority and its programs.

Sincerely,

Jerry L. Webster

Jerry Webster
Chairman, ASTA Board of Directors

John W. Ahlen

John W. Ahlen, Ph.D.
President

Research

Basic Research Grants Program

The Arkansas Science & Technology Authority's Basic Research Grants Program funds original, investigative research conducted at Arkansas colleges and universities. Basic Research project proposals are evaluated on a competitive basis and must demonstrate: (1) opportunities to further the career of the individual researcher and capabilities of the institution; and (2) potential social and economic benefits to the state and citizens of Arkansas.

In FY94, the Authority awarded 22 Basic Research Grants to researchers at five Arkansas institutions for a total of $614,416.

Why Invest in Basic Research?

The real impact of the Authority's Basic Research Grants Program is measured by the amount of federal funding of research dollars that often follows the initial ASTA grant. This leveraged follow-on funding helps enhance the State's research base, which, in turn:

- creates a greater number of research opportunities for Arkansas' students and young scientists;
- attracts prominent faculty, researchers and engineers to the state; and
- improves the overall economic development of the state.

Applied Research Grants Program

The Arkansas Science & Technology Authority's Applied Research Grants Program funds research conducted at Arkansas colleges and universities that is co-sponsored by a business or industry. This arrangement creates partnerships between the business and the institution and ensures that a portion of Arkansas' research base meets the expressed needs of industry.

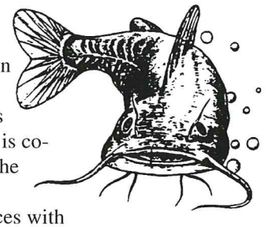
Six Applied Research Grants were awarded this year, totaling $140,290 and drawing $207,184 in industry co-sponsor matches.

To encourage industry-driven research and investment in the Applied Research Grants Program, co-sponsors are eligible for Arkansas state income tax credits through the Authority's Research and Development Tax Credit Program.

Highlight Project

In 1994, the Authority awarded an Applied Research Grant in the amount of $26,200 to Dr. Daniel Schlenk of the University of Arkansas for Medical Sciences (UAMS) for the research of potential additives for "off-flavor" in catfish. Off-flavor is a naturally occurring phenomenon caused by certain odorous chemicals, such as 2-methylisoborneol (MIB), that are produced by populations of bacteria and algae.

The project will test the addition of enzyme-inducing agents to catfish feed in conjunction with the use of specialized purging tanks. This process should serve to enhance the rate of MIB removal and remedy the off-flavor in catfish. If successful, this project, which is co-sponsored by the Southern Farmers Services with $26,000 in matching funds, has the potential to increase the sales of Arkansas-cultivated catfish by 50-80 percent during the late summer and early fall when off-flavor occurs (see figure on this page).



This map indicates the areas in the state impacted by aquaculture and the outcomes of off-flavor research.

Note: Aquaculture is currently Arkansas' twelfth leading crop in terms of dollar value with catfish sales totaling more than $30 million in 1992 alone. In addition, catfish is capturing nearly five percent of the total seafood market, ten times the share since 1970. With the greatest return per acre when compared to Arkansas' other leading crops, aquaculture will play an even greater role in Arkansas' economy.

FY94 Basic Research Grants Awarded

	Recipient	Project Title	Amount
UAF	Xu	Fine Properties of Solutions to Problems in Electrical Heating of a Conductor	$11,551
UAF	Proctor	Lipid Adsorption Properties of Silicate Adsorbents	$21,152
UAF	Tabachnikov	Geometry and Dynamics of the Dual Billiard Transformation	$12,152
UAMS	Liu	Ionotropic Effects of N-Terminal Peptides on Cultured Adult Rat Ventricular Myocytes	$30,005
ACH	Pihoker	Growth Effects of Growth Hormone Releasing Peptide	$30,000
UAMS	Kelly	Determination of Cell-Surface Protease Activity	$31,404
UAF	Basu	Bayesian Analysis of the Link Function in Binary Response Regression	$13,819
UAF	Ryan	Applications of Clifford Analysis to Boundary Value Problems	$12,929
UAF	Beitle	Development of Immobilized Metal Affinity Separation (IMAS)	$30,001
ASU	Memon	Compression of Multispectral Image Data	$29,562
UAF	English	Probability-Based Process Diagnosis in Machining Processes	$35,873
UAMS	McCammon	Genetic and Biochemical Analysis of Ethanol and Acetate Metabolism	$32,450
UAMS	Kaushal	The Role of Glomerular Metallo-Proteinases in Diabetic Nephropathy	$33,858
UAF	Richardson	Multiple Wavelength Solar Radiometer	$54,599
UAF	Arnold	Distributed Approximating Functions in Signal Processing	$11,843
UAMS	Yeh	Structure Function Relationships of Human NDP Kinase A	$40,200
UAF	Li	Discrete Optimization Problems in VLSI CAD & Design Automation	$30,579
ASU	Gilmore	Detection Method for Cytophaga-like Bacterial Fish Pathogens	$20,533
UAF	Driscoll	Partial Oxidation of Methane to Formaldehyde	$29,833
UAMS	Blevins	Estrogens and Pathophysiology of the Exocrine Pancreas	$34,500
UAMS	Hine	Folate Availability Modulates Transformation of JB6 Mouse Cells	$31,973
UCA	Runge	Molecular and Biochemical Regulation of Apoptotic Cell Death	$35,600
TOTAL			**$ 614,416**

FY94 Applied Research Grants Awarded

	Recipient Co-Sponsor	Project Title	Match	Amount
UAF	Olejniczak Entergy Services, Inc.	Development of Three-Phase Harmonic Generator	$71,500	$43,000
UAF	Siebenmorgen Riceland Foods, Inc.	Evaluation of Desiccant Drying of Rice	$20,000	$20,000
UALR	Bakr American Fiber Industries, LLC	Development of Injection Molded Plastic Parts	$21,500	$21,598
UALR	McLeod Remington Arms Company, Inc.	High Speed Spectral Analysis of Optical Emission	$30,884	$29,492
UALR	Talburt Acxiom Corp.	Converting and Standardizing External Data in the Acxiom Customer Service Process	$37,100	$200
UAMS	Schlenk SF Services	Potential Feed Additives for Off-Flavor in Catfish	$26,200	$26,000

TOTAL $140,290

TOTAL MATCH $207,184

FY94 DOE/ASTA EPSCoR Traineeships Awarded

Project	Professor/University	Grantee
Neutron Energy Response Calculations	West (UAF)	Lemley
Viscoelastic System Characterization	Oliver (UAF)	Schulte
Solenoidal Tracker Design	Braithwaite (UALR)	Burks
Multijunction Solar Cells	Naseem (UAF)	Kizzar
Particle Analyzer	Adams (UALR)	Masters
Spectroscopy of Hydrocarbon	Hudson (UALR)	Underhill-Shanks
Proteins in Photo-Synthesis	Davis (UAF)	Scharlau
Drying of Rice	Siebenmorgen (UAF)	Schulman
Molecular Conductors	Cordes (UAF)	Bryan
Superconducting Films	Ulrich (UAF)	Nelms
Vapor Deposition Reactor	Ulrich (UAF)	Palmer
Detection of NOx and SO2	Hudson (UALR)	Lindquist
Superconductor Films	Salamo (UAF)	Elkins
Coherent Pions	Braithwaite (UALR)	Byrd
Instrumenting Detector	Rollefson (UALR)	Mauldin
Diamond Films	Xiao (UAF)	Bootz
Photovoltaic Inverter	Olejniczak (UAF)	Daniels
Multijunction Solar Cells	Brown (UAF)	Harper

TOTAL AWARDED $259,542

EPSCoR

Responding to concerns about geographical inequities in the distribution of research dollars, the National Science Foundation (NSF) established the federal Experimental Program to Stimulate Competitive Research (EPSCoR) in 1978. Arkansas was one of eighteen states (as well as Puerto Rico) chosen to participate in the program based on levels of federal funding. Arkansas' EPSCoR Program, established in 1979 with the creation of the Arkansas EPSCoR Committee, is responsible for the planning and implementation of activities that will improve the quality of research in the state, increase the number of federally-funded scientists, and effect long-term gains in the state's research base.

EPSCoR Traineeship Program

Arkansas EPSCoR, in conjunction with the Authority, makes available 20 U.S. Department of Energy/ASTA Traineeship Grants each year to graduate students involved in energy-related fields of study. Departments at three Arkansas institutions submitted proposals for traineeships in FY94, including: the University of Arkansas, Fayetteville; the University of Arkansas at Little Rock; and Arkansas State University. Each of the $25,000 traineeships awarded consists of a $21,000 annual stipend, $3,000 for tuition and fees, and $1,000 for travel and publication-related costs. The traineeships enhance the energy-related research, resources and infrastructure of the state.

Centers for Applied Technology

Through Arkansas' NSF EPSCoR Program, the Centers for Applied Technology, as established in 1989, to encourage collaborations between institutions of higher-learning and private enterprises. The collaborations are intended to speed the discovery, development and application of new technology.

In FY94, the Governor released $450,000 from the General Improvement Fund to help support the NSF Centers for Applied Technology. These include: the Center for Protein Dynamics at the University of Arkansas, Fayetteville; the Arkansas Neurobiology Research Center at the University of Arkansas for Medical Sciences; and the Center for Cellular and Molecular Studies on Biological Aging at the University of Arkansas for Medical Sciences. A fourth center, the Material Handling Research Center, was established in 1990 with support from this program.

Arkansas Space Grant Consortium

Working through Arkansas' NASA EPSCoR Program, the Authority established the Arkansas Space Grant Consortium, a training grant program initiated to educate and familiarize faculty and students with aerospace fundamentals and NASA's research programs. This year, the Governor released $75,000 from the General Improvement Fund to help support the Consortium.

EPSCoR Special Initiatives

An Experimental Systemic Initiative (ESI) award was made to the Arkansas EPSCoR Committee in FY94. This award supports a statewide undergraduate research pilot project, which is matched with funds from the Department of Higher Education. The Silo Undergraduate Research Fellowship (SURF) Program was also initiated this year. This program offers high quality students an opportunity to compete for up to 40 hours of support during the academic year and summer with a stipend.

Staff of the Arkansas EPSCoR Program served on the Steering Committee that prepared and submitted a grant proposal to the National Science Foundation's Rural Systemic Initiative. This project, which received $330,000 from NSF, represents a regional effort to implement systemic educational reform in the Mississippi Delta counties of the States of Arkansas, Louisiana, and Mississippi. Eleven counties have been identified in Arkansas that are eligible for this project.

Development

Technology Development Program

The Arkansas Science & Technology Authority's Technology Development Program awards funds on a competitive basis for prototype development, testing and related activity. Proposals submitted to this program by Arkansas-based businesses, inventors and others must demonstrate sound technical feasibility, as well as economic and commercial potential. Enabling legislation established a maximum funding level of $50,000 per technology, and a payback provision for successful technology development projects. The payback is through a negotiated royalty of up to five percent of net sales revenue per year for up to ten years.

Highlight Project

In FY94, the Authority approved the first Technology Development Program project for funding using state appropriations. An award of $10,225 was made to Steve Walker, a Malvern-based inventor, for development of innovative air conditioning technology that has potential application in the van and recreational vehicle markets. This project received an outstanding technical review from the National Institute of Standards and Technology (NIST) for its innovative technology, and prompted NIST to create a nonenergy-related technology development program to evaluate similar high-quality projects. This project is also notable because it represents the first ASTA award made to an Arkansas inventor.

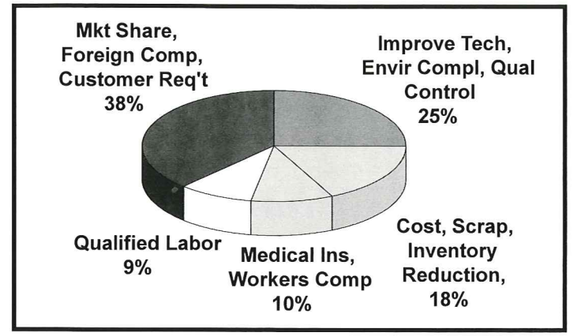
Technology Transfer Program

The Arkansas Science & Technology Authority's Technology Transfer Program has two distinct components. The ***Technology Transfer Services Program*** provides assistance to Arkansas-based companies by linking them with the appropriate resources that can provide technical solutions to a company's problems. The Authority facilitates these relationships through its partnerships with the Mid Continent Technology Transfer Center (MCTTC) and the NASA Marshall Space Flight Center, as well as through informal affiliations with Arkansas colleges and universities, research centers, technical firms and other resources. This brokerage role ensures that a company's problems are addressed with accurate, up-to-date, and timely solutions.

In FY94, the Authority conducted 31 site visits to Arkansas small and medium-sized manufacturers and assisted them with 47 specific problems statements. These problems were addressed with solutions generated through the resources of the ASTA/NASA partnerships. Through funding support provided by MCTTC's Technology Access for Product Innovation (TAP-IN) Program, formalized in May 1994, the Authority will be working to expand technology transfer services in the next year by providing manufacturers with regional workshops and financial assistance for marketing efforts.

The Technology Transfer Assistance Grant (TTAG) Program provides funding to defray costs associated with technology transfer and implementation. This program provides up to $3,750 per technology transfer project to cover a wide range of costs, including engineering or technical support fees and database searches, among others. Each Arkansas-based enterprise is eligible to receive assistance through two technology transfer projects per year from this program, and projects are evaluated on a competitive basis.

The Authority awarded ten TTAG projects in FY94, following the official April 13, 1994 effective date of the program rules. In keeping with the intent of the program, there is a quick response time between proposal submission and project funding. This procedure ensures that a company receives the assistance needed in a timely fashion, thus helping the firm to gain or retain a competitive edge in the market.



Manufacturers' Most Pressing Challenges

Highlight Project

In FY94, the Authority funded $3,750 to support the development of a computerized system that incorporates the relationships between the weight of a manufactured shirt, the dimensions of cartons used in packing and shipping, and the number of shirts that can be packed in one container. This project will also track these relationships against existing National Institute of Occupational Safety and Health (NIOSH) guidelines for various lifting tasks (the company must ensure that the packages shipped conform with the guidelines for worker safety) and will integrate the variables into the system. The Arkansas Center for Technology Transfer at the University of Arkansas (Fayetteville) will be providing this assistance to the Capital Mercury Shirt Company, Inc. of Gassville. The company is providing $1,830 in matching funds for this project.

Seed Capital Investment Program

The Arkansas Science & Technology Authority's Seed Capital Investment Program (SCIP) provides risk financing for the initial capitalization or expansion of Arkansas businesses that are using technological innovations to commercialize a new product or service, or improve an existing process. The average investment made by the SCIP fund since the program's inception is $170,000, and each dollar invested is leveraged by three dollars in matching funds from other sources. The SCIP fund is limited to working capital and does not finance fixed assets.

Funding awards are treated as an investment and payback is collected using a number of instruments, including debt obligations, royalties and bank participations. Applications are evaluated and must demonstrate the following: (1) a science and/or technological impetus for the start-up or expansion of the company; (2) prudent company management; and (3) economic impact and/or job creation potential.

The Authority's SCIP Fund made two investments in FY94 totaling $445,000 and leveraging $2,030,000 in matching funds from other sources.

Highlight Project.

In FY94, the Authority invested $150,000 for the commercial development of cap enclosures used on bottled natural spring water. Utilizing a more economic and lightweight plastic material, as well as an innovative manufacturing process American Fiber Industries (AFI), LLC of Little Rock, will be able to produce bottle caps and bottles at a cost that is significantly less expensive than what is currently on the market. AFI, LLC is currently producing these caps for NORA Beverages, one of the world's leading bottlers of natural spring water.

This investment is particularly noteworthy because it follows the completion of a project funded through the Authority's Applied Research Grants Program. The Authority provided $21,598 to help support the research and testing of the plastic material as well as innovative manufacturing processes used in the bottle cap development. American Fiber Industries, LLC provided $21,500 in matching funds to support this research, which was conducted at the University of Arkansas at Little Rock.

Special Projects

Arkansas Ventures In Education Project

The Arkansas Ventures in Education (VIE) Project promotes academic reform and the enhancement of science and math education at selected junior and senior high schools in Arkansas' rural Delta counties. Funded primarily by the National Science Foundation, the Arkansas VIE Project combines curriculum enhancement, high quality faculty development, and academic enrichment activities to motivate and prepare students for success in college, post-secondary training or employment. The Project has also received local funding from the Winthrop Rockefeller Foundation, the Coca-Cola Bottlers of Arkansas, Southwestern Bell Telephone Company and the Arkansas Electric Cooperatives Corporation.

Since the summer of 1992, the VIE Project has involved 3,211 students from seven schools in four districts, including Lakeside, Dumas, Lee County and Stuttgart. In addition, 231 teachers have received specialized training in a variety of Student-Centered Teaching Methods through VIE workshops, seminars and follow-up training. Comparative data on students' performance on standardized tests indicate the project's early success. Dumas High School students increased their scores on the PSAT (a preliminary college entrance examination) by an average of 30 points per student after taking the exam in both the ninth and tenth grades. This improvement rate was 20 points higher than the average rate of improvement on the same tests administered to students nationwide during the same time period.

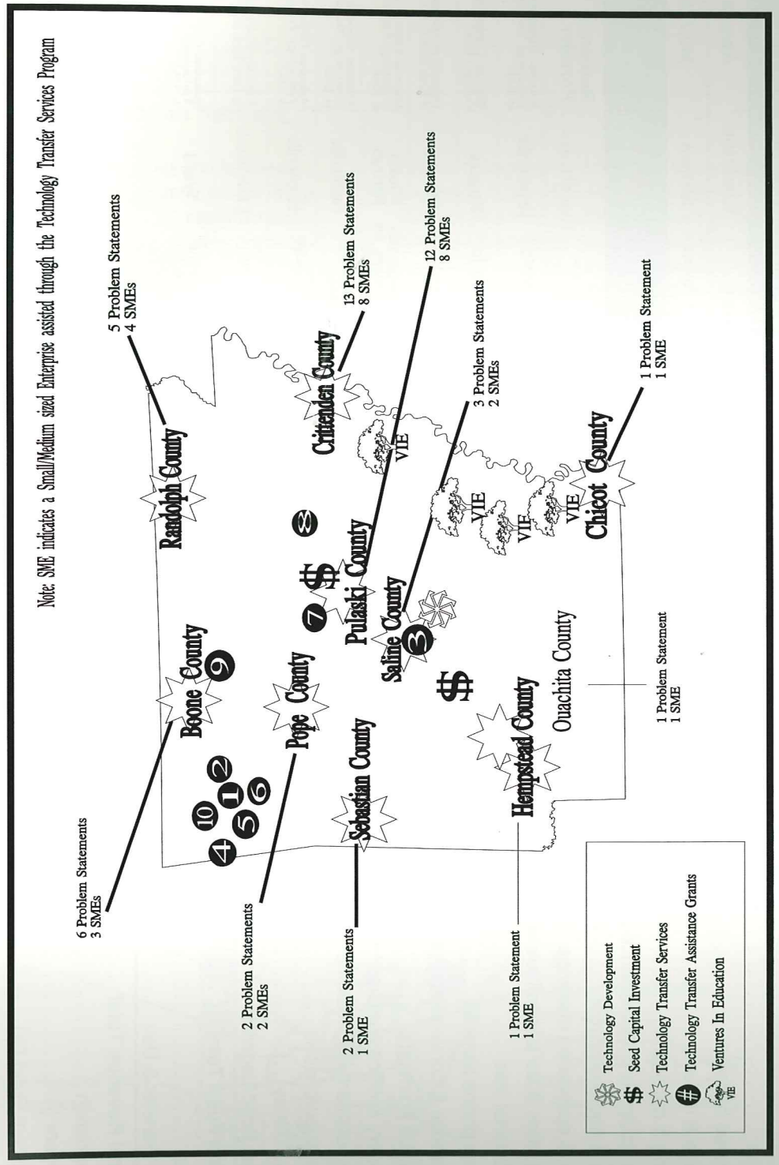
Statewide Research and Development Planning

In FY94, Governor Jim Guy Tucker appointed a Research & Development (R&D) planning group to develop a comprehensive statewide R&D plan that emphasizes the state's needs. Anticipating the agenda of federal agencies to provide funding to only those states that have a demonstrated research plan, the Authority's Board of Directors urged the President of the agency to facilitate this effort in conjunction with the Arkansas EPSCoR planning process. The members of the R&D planning group are from academia, the public sector and industry. The group will meet several times during the Summer of FY95 with a completed plan expected in September.

Telecommunications

As part of the nationwide effort to build an information superhighway, the President of the Authority was asked to work with the Governor's Office to conduct a feasibility study for an Arkansas Information Network. This study focused on two areas: (1) services for state government agencies; and (2) a network for voice-data-video services. This feasibility analysis was completed in FY94 and a report was presented to the Governor for review. Further work on this effort will be determined for FY95. This may include the preparation of a detailed workplan for the development of a network that meets the information and advanced communications needs of the state.

ASTA Development & Special Projects - FY 1994



	Annual Budget	Expenditures	% Exp
Salaries	$379,647.00	$379,472.98	100%
Employee benefits	90,802.00	90,074.75	99%
Postage & delivery	5,425.00	4,599.00	85%
Printing & duplicating	2,928.00	3,003.01	103%
Office equipment maintenance	2,780.00	3,063.59	110%
Office & equipment rent	50,058.00	47,681.33	515%
Travel & sponsored meetings	23,453.00	23,726.56	101%
Association dues & membership	13,000.00	12,961.50	100%
Professional fees	7,950.00	7,934.06	100%
Centrex phone services	8,200.00	8,517.24	104%
Conference & convention fees	15,394.00	15,310.69	99%
Insurance premiums	380.00	376.00	99%
Stationery & office supplies	4,437.00	4,273.45	96%
Subscriptions & publications	2,802.00	2,954.42	105%
Software purchases	1,200.00	1,168.78	97%
Capital Outlay	5,001.00	5,000.55	100%
Blanket Bond/Legislative Audit	**788.97	788.97	100%
General Fund Total	**$614,245.97**	**$610,906.88**	**124%**
Grants	*$899,028.00	$849,293.39	94%
Tech. Transfer & Dev.	45,715.00	45,715.00	100%
General Revenue Total	**$1,558,988.97**	**$1,505,915.27**	**97%**
Appropriation	$1,928,558.00		
Deferment (-)	$370,358.00		
Adjustment Fund (+)	$0.00		
Available Allocation	$1,558,200.00		

**$44,734.61 - carry forward to FY95*

*** Fund Transfer for Blanket Bond and Legislative Audit*

FY 1994 Technology Development Projects

Company	Location	Award
Steve Walker, Inventor	Malvern	$10,225

FY 1994 Technology Transfer Assistance Grants (TTAG)

	Company	Location	Resource Provider
1	Baldwin Specialty Products, Inc.	Fayetteville	Arkansas Center for Technology Transfer at UAF
2	FiberTech Group, Inc.	Rogers	Westark Community College (WCC)
3	North American Marine Jet, Inc.	Benton	University of Arkansas at Little Rock (UALR)
4	Alternative Design Manufacturing & Supply, Inc.	Siloam Springs	Arkansas Center for Technology Transfer at UAF
5	Baldwin Specialty Products, Inc.	Fayetteville	Arkansas Center for Technology Transfer at UAF
6	Baldwin Specialty Products, Inc.	Fayetteville	Arkansas Center for Technology Transfer at UAF
7	Thibault Milling Company	Little Rock	University of Arkansas at Little Rock (UALR)
8	Universal Antenna Manufacturing, Inc.	Ward	Arkansas Center for Technology Transfer at UAF
9	Capital Mercury Shirt Company, Inc.	Gassville	Arkansas Center for Technology Transfer at UAF
10	The Front Porch Appraisal Co., Inc.	Springdale	Arkansas Center for Technology Transfer at UAF

FY 1994 Seed Capital Investment Awards

Company	Location	Award
Hot Metal Technologies, Inc.	Arkadelphia	$295,000
American Fiber Industries, LLC.	Little Rock	$150,000

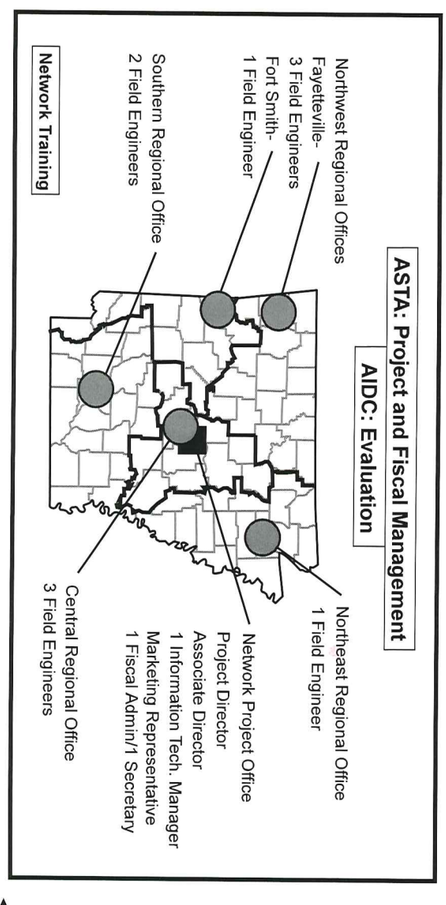
Manufacturing Extension Network

The State's primary technology and business service providers have made great strides this past year to the benefit of Arkansas' manufacturers. These institutions, agencies and other organizations have formed a partnership, the Arkansas Manufacturing Extension Network, that is built on cooperation, coordination and commitment. Network participants have signed a formal charter that encourages strong working relationships and ensures that Arkansas industry has access to the best and most responsive services and assistance that the State's resources can provide.

An Industry Advisory Council was also established to ensure that the quality and types of services and assistance offered through the Network meet the expressed needs of Arkansas' industry. Members of this Council are appointed by the Network participants and are recognized leaders experienced in quality and operations management.

Efforts to implement Arkansas' Manufacturing Extension Network continued in FY94 with the submission of funding proposals to the National Institute of Standards and Technology (NIST) and the Advanced Research Projects Agency's Technology Reinvestment Project (TRP). The NIST proposal was unsuccessful, and the Authority expects an announcement on the TRP award in the Fall of 1994.

If fully funded, this Network will integrate and coordinate existing technology and business assistance service providers with new statewide capabilities including field offices staffed with engineers, electronic linkages, a "1-800" number to access assistance through the Network, and evaluation of statewide services. As proposed, this newly structured Network will meet the needs of Arkansas' small and medium-sized firms by providing access to comprehensive technology, management, and training services to assist them in becoming world-class competitors.



Numerous areas in the state are benefiting from the newly formed Arkansas Manufacturing Extension Network, as depicted in this graphic.

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